Alg. 2 Warm Up # 9-5

1. $\sin\theta = \dfrac{3}{5}$, find $\cos\theta$ using the pythagorean identity. (see page 343 if you don't remember)

2. Write the equation for the circle in standard form and state the center and radius. (No decimals!)

$$x^2 + y^2 - 10x + y - 5 = 0$$

HW Questions:

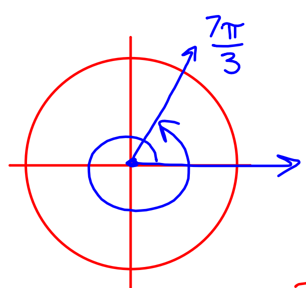
7-104. What central angle, measured in degrees, corresponds to a distance around the unit circle of $\frac{7\pi}{3}$?

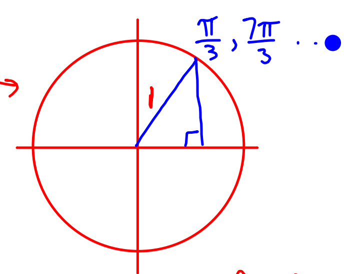
a. What other angles will take you to the same point on the circle? $\frac{\pi}{3}$, -300°, . . .

b. Make a sketch of the unit circle showing the resulting right triangle.

c. Find $\sin\left(\frac{7\pi}{3}\right)$, $\cos\left(\frac{7\pi}{3}\right)$, and $\tan\left(\frac{7\pi}{3}\right)$ exactly.

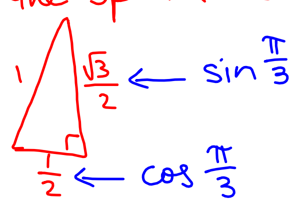
TOA, look at the Δ →





c) $\sin\frac{7\pi}{3} = \sin\frac{\pi}{3} = \boxed{\frac{\sqrt{3}}{2}}$

from the special Δ

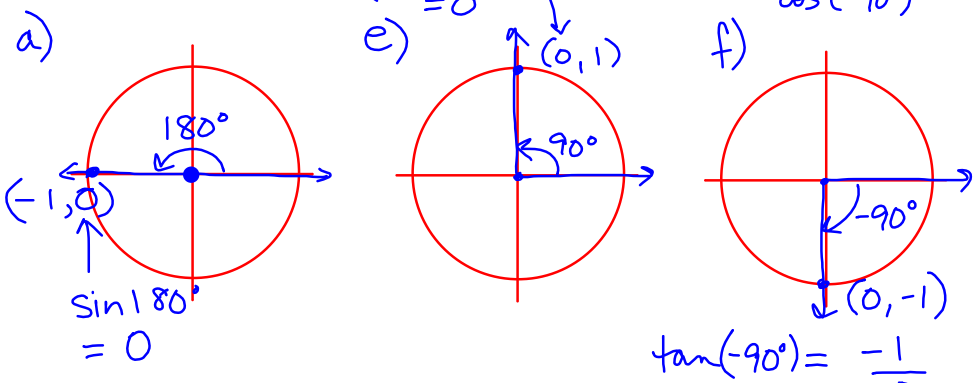


$(x, y) \rightarrow (\cos\theta, \sin\theta)$

7-105. Evaluate each of the following trig expressions without using a calculator.

a. $\sin(180°)$ b. $\sin(360°)$ c. $\sin(-90°)$

d. $\sin(510°)$ e. $\cos(90°) = 0$ f. $\tan(-90°) = \dfrac{\sin(-90°)}{\cos(-90°)}$



$\tan(-90°) = \dfrac{-1}{0}$

undefined.

7-106. How do you convert from degrees to radians and from radians to degrees? Explain and justify your method completely. Add some examples to your Toolkit.

π radians = 180°

degrees to radians

$\dfrac{45°}{1} \cdot \dfrac{\pi \text{ rad.}}{180°} = \dfrac{\pi}{4} \text{rad}$

7-107. Convert each of the following angle measures. Give exact answers.

a. $\frac{7\pi}{6}$ radians to degrees

b. $\frac{5\pi}{3}$ radians to degrees

c. 45 degrees to radians

d. 100° to radians

e. 810° to radians

f. $\frac{7\pi}{2}$ radians to degrees

$\dfrac{5\cancel{\pi}}{\cancel{3}}\,\cancel{\text{radians}} \cdot \dfrac{\cancel{180}^{60}°}{\cancel{\pi}\ \cancel{\text{rad}}} = 300°$

7-108. Sketch a graph of $f(x)=\frac{1}{2}(x+1)^3$. Then sketch its inverse and write the equation of the inverse.

left 1
compression by $\frac{1}{2}$

7-109. Rewrite $f(x)=2x^2-16x+34$ in graphing form.

$f(x)=2(x^2-8x+\underline{16})+34\,\underline{-32}$

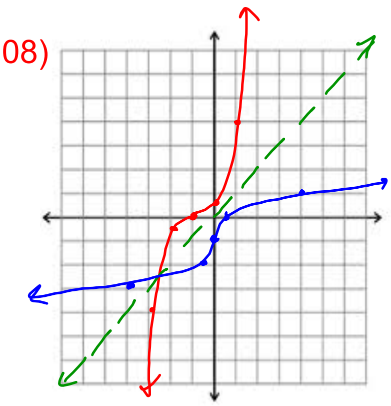
$f(x)=2(x-4)^2+2$

x	$f(x)$
-3	-4
-2	-½
-1	0
0	½
1	4

inverse

x	y
-4	-3
-½	-2
0	-1
½	0
4	1

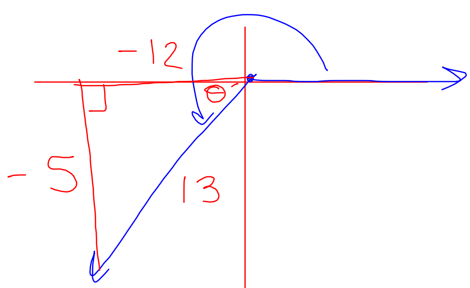
108)



7-110. For angle θ in the third quadrant, $\cos\theta=-\frac{12}{13}$. Use this information to find each of the following values without using a calculator.

a. $\sin\theta = -\frac{5}{13}$

b. $\tan\theta = \frac{-5}{-12} = \boxed{\frac{5}{12}}$



$y^2+(-12)^2=13^2$

$y=$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$= \frac{-\frac{5}{\cancel{13}}}{-\frac{12}{\cancel{13}}}$

$= \frac{5}{12}$

Given that $\log_x 2 = a$, $\log_x 5 = b$, and $\log_x 7 = c$, write expressions using a, b, and/or c for each log expression below.

a. $\log_x 10$ b. $\log_x 49$ c. $\log_x 50$ d. $\log_x 56$

$\log_x 2\cdot 5^2 = \log_x 2 + \log_x 5^2$

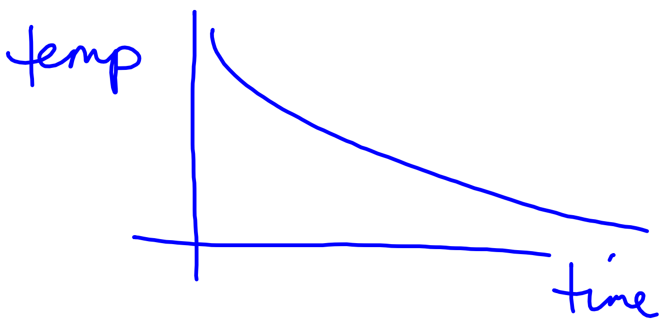
$\log_x 2 + 2\log_x 5$

$a \quad + 2b$

The temperature of a pizza after it has been delivered depends on how long it has been sitting on the family-room table.

a. Sketch a reasonable graph of this situation. Be sure to label the axes.

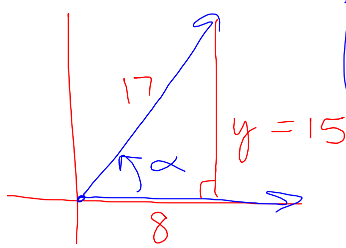
b. Should your graph have an asymptote? Why or why not?



From CP's: # 86 ---> 89

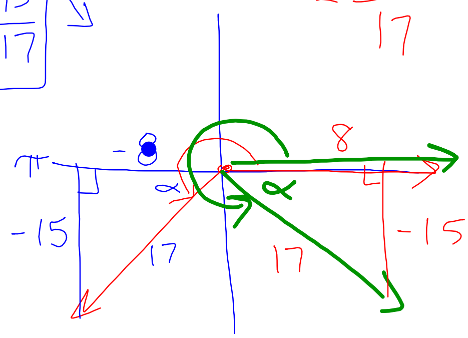
7-89. For angle α in the first quadrant, $\cos\alpha = \frac{8}{17}$. Use that information to find each of the following values without using a calculator. Be prepared to share your strategies with the class.

a. $\sin\alpha = \frac{15}{17}$ b. $\sin(\pi+\alpha)$ $\boxed{= -\frac{15}{17}}$ c. $\cos(2\pi-\alpha)$ $= \frac{8}{17}$



$y^2 + 8^2 = 17^2$

$y =$



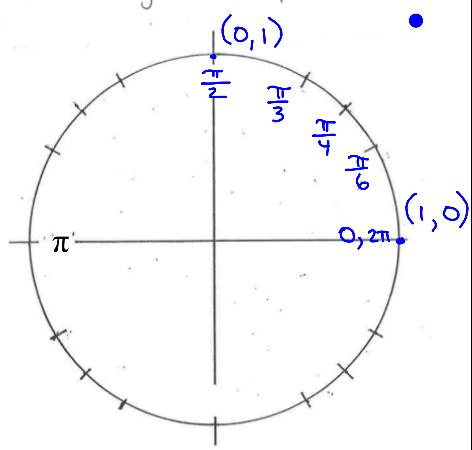
$\boxed{7-101}$ a) Complete the table: $\tan\theta = \frac{\sin\theta}{\cos\theta}$

Radians θ	Exact $\sin\theta$ (y)	Exact $\cos\theta$ (x)	Exact $\tan\theta$	Approx. $\tan\theta$
0	0	1	0	0
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	0.58
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$			
$\frac{\pi}{2}$	1	0	undef.	

$\tan\frac{\pi}{2} = \frac{1}{0}$

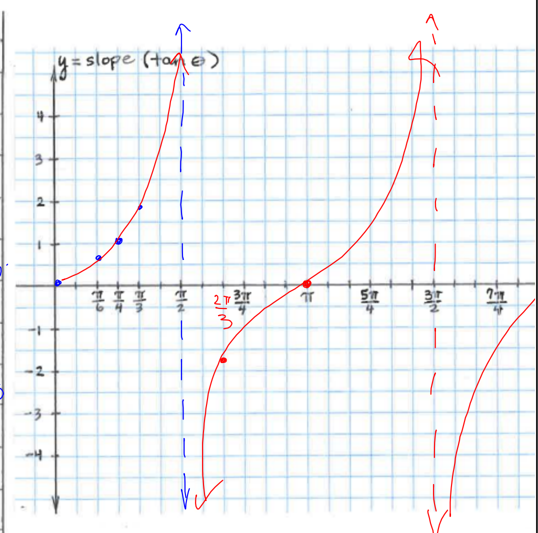
Two ways to calculate
① → $1 \div \sqrt{3}$
② → $\tan(\pi \div 6)$
* in radian mode

Draw Δ's on the unit circle below to figure out slopes ($\tan\theta$)



yesterday's CP's

Radians θ	Exact $\sin\theta$	Exact $\cos\theta$	Exact $\tan\theta$	Approx. $\tan\theta$
0				0
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	0.58
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$			1
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$			1.73
$\frac{\pi}{2}$				undef.
$\frac{2\pi}{3}$				-1.73
$\frac{3\pi}{4}$				-1
$\frac{5\pi}{6}$				-0.58
π				0
$\frac{7\pi}{6}$				
$\frac{5\pi}{4}$				
$\frac{4\pi}{3}$				
$\frac{3\pi}{2}$				
$\frac{5\pi}{3}$				
$\frac{7\pi}{4}$				
2π				

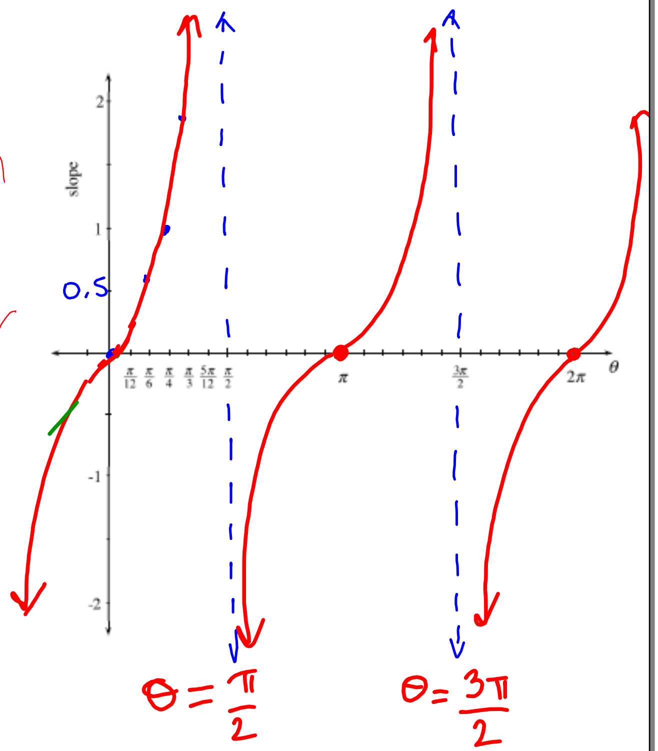


Domain

$\theta \neq \frac{\pi}{2} + \pi n$

let n = integer

$(\pi n, 0)$



Lesson 7.1.7 Resou

7-102. Investigate the tangent graph by analyzing the following questions:

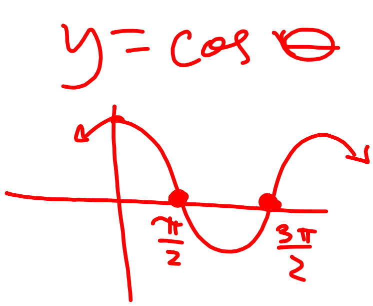
a. Describe the domain and range of the tangent function.

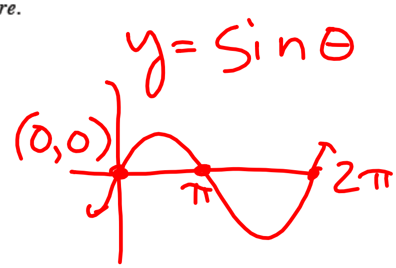
b. Describe any special points or asymptotes.

c. Does it have symmetry? Describe any symmetry you see in the graph.

d. How is the graph of $t(\theta) = \tan\theta$ different from the graphs of $s(\theta) = \sin\theta$ and $c(\theta) = \cos\theta$?

Further Guidance section ends here.





7-103. Draw a new unit circle and label a point that corresponds to a rotation of $\frac{\pi}{6}$ radians.

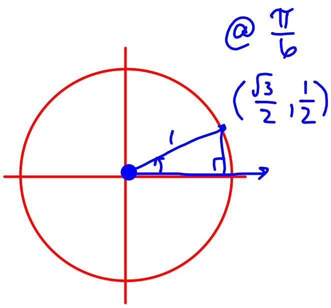
a. What are the coordinates of this point? Use exact values.

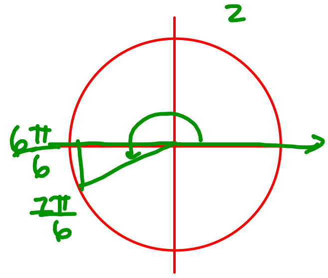
b. Use this information to find each of the following values without a calculator. (Hint: Drawing each angle on the unit circle will be very helpful.)

i: $\tan\left(\frac{7\pi}{6}\right)$ *ii:* $\cos\left(\frac{13\pi}{6}\right)$ *iii:* $\tan\left(\frac{2\pi}{3}\right)$

i) $\tan = \frac{\sin}{\cos} \quad \frac{y}{x}$

$\tan \frac{7\pi}{6} = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$





[Week 9](#)
Warm Up
7- #71 ---> 76 (blue)
7- #86 ---> 89
with Unit Circle
7- # 99, 101-103
with tangent graph

CP's: 7- # 113 ---> 115, (#114 is read only)

p. 345

7.2.1 How can I transform a sine graph?

Transformations of $y = \sin x$

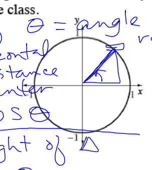
In Chapter 2, you developed expertise in investigating functions and transforming parent graphs. In this section, you will investigate families of cyclic functions and their transformations. By the end of this section, you will be able to graph any sine or cosine equation and write the equation of any sine or cosine graph.

7-113. As you have seen with many functions in this and other courses, x is generally used to represent an input and y is used to represent the corresponding output. By this convention, sinusoidal functions should be written $y = \sin x$, $y = \cos x$, and $y = \tan x$. But beware! Something funny is happening.

With your team, examine the unit circle and the three graphs below. What do x and y represent in the unit circle? What do they represent in each of the graphs? Discuss this with your team and be prepared to share your ideas with the class.

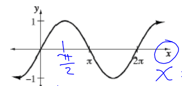
θ = angle of rotation.

a.



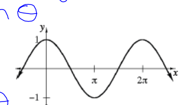
horizontal
x = distance from center
$x = \cos\theta$
y = height of Δ
$y = \sin\theta$

b.



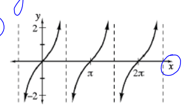
$x = \theta$
y = height
$y = \sin x$

c.



$x = \theta$
y = horizontal distance from center
$y = \cos x$

d.



$x = \theta$
$y = \dfrac{\sin\theta}{\cos\theta}$
y = slope of the radius of circle
$y = \tan x$

Just read:

7-114. With your team, you will apply your knowledge about transforming graphs of functions to transform the graphs of $y = \sin x$ and $y = \cos x$ and find their general equations.

Your Task: As a team, investigate $y = \sin x$ and $y = \cos x$ completely. You should make graphs, find the domain and range, and label any important points or asymptotes. Then make a sketch and write an equation to demonstrate each transformation of the sine or cosine function you can find. Finally, find a general equation for a sine and a cosine function. Be prepared to share your summary statements with the class.

Discussion Points

What can we change in a cyclic graph?

Which points are important to label?

How can we apply the transformations we use with other functions?

Are there any new transformations that are special to the sine function?

Further Guidance

7-115. Sketch a graph of at least one cycle of $y = \sin x$. Label the intercepts. Then work with your team to complete parts (a) through (c) below.

a. Write an equation for each part below and sketch a graph of a function that has a parent graph of $y = \sin x$, but is:

i. Shifted 3 units up.

ii. Reflected across the x-axis.

iii. Shifted 2 units to the right.

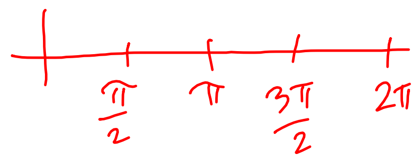
iv. Vertically stretched.

b. Which points are most important to label in a periodic function? Why?

c. Write a general equation for the family of functions with a parent graph of $y = \sin x$.

Further Guidance section ends here.

Change to: shift right $\frac{\pi}{2}$



HW: 7-

#116 ---> 123, skip 119